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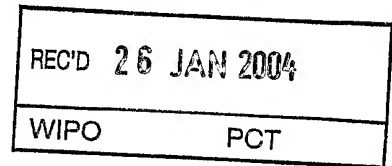
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Patentanmeldung Nr. Patent application No. Demande de brevet n°

03100231.4



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(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.  
If no title is shown please refer to the description.  
Si aucun titre n'est indiqué se referer à la description.)

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Method for coding and/or transmitting EPG data, coder and device comprising a receiver

The present invention relates to a method of coding and/or transmitting EPG (electronic program guides) data documents comprising program and schedule records. The invention also relates to a coder for coding EPG (electronic program guide) data comprising program and schedule records and to a device comprising a receiver for receiving transmitted  
5 coded EPG (electronic program guide) data comprising a decoder for decoding coded EPG (electronic program guide) data comprising program and schedule records.

It is known to transmit information and listings of program information by  
10 means of so-called electronic program guides (EPG), which are based on the transmission of a large database of program information. Conventionally the EPG data produced by e.g. a server regarding programs and their scheduled times is structured into sections. The EPG data is transmitted to a receiving device such as e.g. a remote control device.

Embedded and/or restricted devices need to download large sets of (E)PG data  
15 from some server (via Internet, cable, GSM, or any other network). Since devices have limited computing and storage, it can be difficult to store all (E)PG data in memory.

It's possible to separate the TV listing data in 1) programs and 2) schedules for that program. This separation enable that a program that is rerun several times has only one program record with multiple schedule records.

20 I.e. the show with the title 'Business news' and description 'an update on today's business worldwide', will be rerun at 9PM, 10PM, and 11 PM. In that case there will be one record that contains the *program* information (program id, title, description, comments, ...), so:

25 ('P3992', 'Business news', 'an update on today's business worldwide', ....)

*Three schedule* records will refer to this program. The first schedule will contain the

(schedule id, reference to program id, start time, end time, indication of time shift, ...), so:

5 ('S005', 'P3992', '9PM', '9:30PM', 'live',....),  
('S006', 'P3992', '10PM', '10:30PM', 'rerun',....)  
('S007', 'P3992', '11PM', '11:30PM', 'rerun',.....)

10 This known approach saves a lot of space compared to joining both the program and schedule data into one record. Without joining also the program info (title, description, ...) would be repeated three times.

Examples of such a data coding scheme are e.g. known from US patents 6,263,501 and 5,652,613.

15 Although this scheme is efficient, problems may arise when a large set of EPG data is transmitted (downloaded) on a device having a relatively small memory or when the transmission is interrupted. In such cases, the present coding schemes for to be transmitted EPG data lead to a loss of useful information of stored data.

20 It is the object of the invention to disclose a method, coder and device of the type described in the opening paragraph, enabling an increase of directly useful information, i.e. a reduction of loss of useful information.

To this end a method, coder and device of the type in accordance with the invention is characterised in that the program and schedule record of the EPG data are coded and/or transmitted and received in an order in which program records and schedule records  
25 for programs are interleaved. Interleaved means that each program record is followed or preceded by the corresponding schedule records before or after a next program record is coded and/or transmitted. Thus the program (p) and schedule records (s) are sorted as follows

.....{p1,s11,s12,...s1i},{ p2,s21,s22,...s2i}, {p3,s31,s32,s3i,...} etc

30

(preferably) or

alternatively

$$\{s_{11}, s_{12}, \dots, s_{1i}, p_1\}, \{s_{21}, s_{22}, \dots, s_{2i}, p_2\}, s_{31}, s_{32}, \dots, s_{3i}, p_3\}$$

wherein  $p_1, p_2, p_3$  etc are program records and  $s_{11}, s_{12}, \dots, s_{1i}$  are schedule records

5 corresponding to program record  $p_1$  and  $s_{21}, s_{22}, \dots, s_{2i}$  are schedule record corresponding to  $p_2$  etc.

The inventors have realized that in the known transmission schemes data are transmitted as follows:

The data is divided into separate sections comprising .

10

*a section with a list of program records*

*short*

( 'P3992', 'Business news', 'an update on today's business worldwide',...)	p1
( 'P3993', 'Matlock', 'the world's best lawyer in action',	p2
( 'P3995', ' ' , ' ' , ' ' , ... )	p3
( 'P3996', ' ' , ' ' , ' ' , .....),	P4

15

*a section with a list of schedule records*

( 'S005', 'P3992', '9PM', '9:30PM', 'live',...)	s11
( 'S006', 'P3992', '10PM', '10:30PM', 'rerun', ...)	s12
( 'S007', 'P3992', '11PM', '11:30PM', 'rerun', ...)	s13
( 'S008', 'P3993', '11:30PM', '12:30PM', 'series', ...)	s21
( 'S009', 'P3995', ' ' , ' ' , ' ' , .....)	s31

20

25

+ possible further sections

The indication  $p_1, p_2, s_{11}, s_{12}$  etc to the right-hand side is shown here for identification purposes as a guide to the eye, they do not form part of the records.

30

In itself this coding and transmission scheme offers a very efficient manner of coding, transmitting and organizing the data in many circumstances.

If the total transmitted data does not overload the memory of the device and the transmission is uninterrupted no real problems occur. However, the problem is that, since the memory is limited, the device may not have enough persistent storage to store all records

in memory. It would have to stop storing downloaded EPG data in memory when it's full or when a certain limit has been reached. If the transmission is interrupted the same phenomena would occur.

In such circumstance the result might be that whereas all program records are stored, only a few schedule records have been stored. In that case the receiving device can only use a percentage of the information on TV programs that has been received, since for at least some program records the crucial corresponding schedule records are missing! In fact the program records that have been stored but for which the schedule records are missing take up valuable memory space.

The same phenomena occurs when the programs records are first transmitted, in which case for at least some schedule records the crucial corresponding program records are missing.

A related phenomena occurs when during transmission of the EPG data the transmission is interrupted. In such cases the problem is not a too small memory, but the interruption of transmission of data.

Stored information is only truly useful when it is complete, so in such circumstances much of the information received is incomplete and thus not truly useful.

The efficiency of the data transmission in a data coding method, a coder and device in accordance with the invention is increased since the device can read, parse and store the downloaded EPG data on the fly as it's being received (it can start reading, parsing and storing before the complete reception of data is finished). At any time the device would have to stop storing EPG data (whether due to a lack of available memory or an unforeseen interruption of transmission) into persistent storage, almost all of the data (but for possibly the very last) that was stored can actually be used.

Preferably the interleaved program and schedule records are sorted on a time basis.

If sorted on time, all data up to a certain time is known to be complete. Gaps in the data are avoided.

It is remarked that the total EPG document may have other additional information sections such as a section with detailed information on the content of programs. Preferably these additional information sections are sorted and/or transmitted after a section with interleaved and sorted program records. The additional information is often background information which is of less importance than the combination of program and schedule records. Such information, although useful, does affect the usefulness of the coded data much

less than the interleaved program and schedule records. By coding the interleaved program and schedule codes in a section coded prior (i.e. in front of and transmitted prior to the rest) to other sections comprising information on programs, the most important information is transmitted first. The section comprising the interleaved program and schedule records may be preceded in the coding scheme by short codes with general information, e.g. for identifying the EPG data as such or identifying the section as such.

Preferably the coding scheme is such that schedule records only refer to program records that are placed above them (not below) them thus the scheme

.....{p1,s11,s12,...s1i},{ p2,s21,s22,...s2i}, {p3,s31,s32,s3i,...}.

This scheme offers, in comparison to the alternative scheme

{s11,s12,...s1i,p1},{s21,s22,...s2i,p2},{s31,s32,...s3i,p3}

the advantage that all received information can be identified and allocated and this is useful, whereas in the alternative scheme the last received information part (because of the missing of the program record) might not be useful.

The EPG document (the section related to the program & schedule info) always starts with a program record: *progrec 1*.(p1) Directly after that comes the first schedule record: *schedrec 1*. This schedule record will refer to the progrec 1 just before it (p1) and thus could be named s11. This scheme is repeated for all programs, and sorted based on the date/time of the schedules records. Only in the case where a program record is a rerun, so would be double, the program record is omitted! The following schedule record will refer to a program record somewhat above it. In this case, two (or more) schedule records follow each other, which could be named s11 and s12 etc..

*section with a list of interleaved and sorted program records and schedule records*

.....		
('P3991',	'News', 'the news', ..)	p0
('S005',	'P3991', '8PM', '9PM', 'live', ....)	s01
('P3992',	'Business news', 'an update on today's business worldwide', ...)	p1

	('S001', 'P3992', '9PM', '9:30PM', 'live', ....)	s11
	('S001', 'P3992', '110PM', '10:30PM', 'rerun', .....)	s12
	('S001', 'P3992', '111PM', '11:3-PM', 'rerun', .....)	s13
	('P3993', 'Matlock', 'the world's best lawyer in action', .....)	p2
5	('S008', 'P3993', '11:30PM', '12:30PM', 'series',	s21
	('P3996', '...', '...', '...')	p3
	('S009', 'P3996', '...', '...', '...', '...')	s31
	('P4723', '...', '...', '...')	p4
	('S049', 'P4723', '...', '...', '...', '...')	s41

10

A possible implementation could consist of the following:

1. A screen based remote control (RC) device, used to control the display device and display the EPG content;
2. An internet-access device, used for downloading EPG content onto the control
- 15 (RC) device;
3. An Internet server, where EPG content in the form of EPG documents can be retrieved from;

Operation is e.g. as follows:

1. On a regular basis, depending on Internet access bandwidth and remote control
- 20 device memory constraints, the RC requests EPG content from the server. Alternatively the server may push an EPG document, i.e. send it even without an implicit request.

2. The server prepares in response to such a request an EPG document coded according to the ordering, sorting and program/schedule interleaving rules in this invention or it may push it. For instance, the EPG data is encoded into an XML format. It is remarked
- 25 that the server may comprise a document which is already encoded in the manner in accordance with the invention, in which case "preparation" is simply taken the already properly encoded document or, alternatively, if such a document is not directly available, the server prepares such an EPG document by retrieving information from other documents and coding the information in the manner in accordance with the invention. To this end the server
- 30 comprises, has access to or is linked with a coder for coding an EPG document in accordance with the invention.

3. The server will start sending the (partially) prepared EPG document to the RC.
4. On the fly, the EPG document is received, parsed and stored in persistent storage on the RC. To this end the RC device (or any other device for receiving the EPG



data) comprises a receiver and a decoder for decoding the EPG data document coded in accordance with the invention.

5. When finished, or when the storage on the receiving device extends a certain limit, the data is still received, but cannot be stored in memory anymore. Optionally, the connection can be ended.

6. The device is certain that all stored data can be optimally used, also in case not all data could have been stored. This is the great advantage of using interleaved program and schedule records, in comparison to the known method of coding and transmitting the data in separate program and schedule code sections.

Access to this Internet site(s) by the remote control device is provided through e.g. an Internet connected device. This can be a PC, STB or dedicated Internet-connection devices like a modem.

The invention can be used e.g. in TV receivers and VCRs or multi-media PCs equipped with a video/teletext capture card.

An example of an implementation of XML encoded EPG data is given herebelow.

```
<program id="392033">
    <title>Matlock</title>
</program>
<schedule program="392033" channel="10" starttime="12.30:00"
endtime="12:45:00" />
<program id="49332">
    <title>Jett Jackson</title>
    <description>Great episode of Jett Jackson.</description>
</program>
<schedule program="49332" channel="21" starttime="20:50:00"
endtime="21:15:00" />
<program id="03992">
    <title>The X-Files</title>
    <description>Mulder encounters ET.</description>
</program>
<schedule program="03992" channel="32" starttime="21:00:00"
endtime="22:00:00" />
```

```
<schedule program="03992" channel="21" starttime="22:30:00"
endtime="22:30:00"/>
<program id="69782">
  <title>News</title>
  <description>The daily news.</description>
</program>
<schedule program="69782" channel="31" starttime="09:00:00"
endtime="10:00:00" />
```

5

10

Table 1: Implementation example of an excerpt of XML encoded EPG data

Within the concept of the invention a 'means for coding', "coder", "means for decoding", "decoder etc" is to be broadly understood and to comprise e.g. any piece of hardware (such a coder or decoder), any circuit or sub-circuit designed for performing a conversion, imposition, rendition as described as well as any piece of soft-ware (computer program or sub program or set of computer programs, or program code(s)) designed or programmed to perform a coding or decoding operation in accordance with the invention as well as any combination of pieces of hardware and software acting as such, alone or in combination, without being restricted to the below given exemplary embodiments.

15

20

The invention is also embodied in a device (such as a server) comprising a coder to a coder for coding EPG (electronic program guide) data comprising program and schedule records in accordance with the method of the invention, in its broadest scope as well as in any of the preferred embodiments described above.

25

The invention is also embodied in a receiving device (RC) comprising a decoder for decoding EPG (electronic program guide) data comprising program and schedule records in accordance with the method of the invention, in its broadest scope as well as in any of the preferred embodiments described above.

30

The invention is also embodied in any computer program comprising program code means for performing a method in accordance with the invention when said program is run on a computer as well as in any computer program product comprising program code means stored on a computer readable medium for performing a method in accordance with the invention when said program is run on a computer.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. The invention

resides in each and every novel characteristic feature and each and every combination of characteristic features. Reference numerals in the claims do not limit their protective scope. Use of the verb "to comprise" and its conjugations does not exclude the presence of elements other than those stated in the claims. Use of the article "a" or "an" preceding an element does  
5 not exclude the presence of a plurality of such elements.

The present invention has been described in terms of specific embodiments, which are illustrative of the invention and not to be construed as limiting. The invention may be implemented in hardware, firmware or software, or in a combination of them. Other embodiments are within the scope of the following claims.

10 In short the invention may be described as follows:

EPG data regarding programs and their scheduled times are structured and/or transmitted in a way such that *program and schedule records* are interleaved. This scheme allows better handling by receiving devices such as embedded devices (i.e. LCD remote controls), since a more efficient receipt and storage of transmitted data is possible. In  
15 particular the receiving device can read, parse and store the downloaded EPG data *on the fly* as it's being received (it can start reading, parsing and storing before the complete reception of data is finished). At any time the device would have to stop storing EPG data into persistent storage, (almost) all of the data that was stored can actually be used. The invention is embodied in a method, but may equally be embodied in a coder or decoder or device  
20 comprising a coder or decoder.

## CLAIMS:

1. Method of coding and/or transmitting EPG (electronic program guides) data documents comprising program and schedule records characterised in that the program (p1, p2, p3) and schedule records (s11, s12, ... s1i, s21, s22, ..., s2i, s31, s32, ..., s3i) of the EPG data are coded and/or transmitted in an order in which program records and schedule records  
5 for programs are interleaved stored and/or transmitted  
(( {p1, s11, s12, ..., s1i}, {p2, s21, s22, ..., s2i}, {p3, s31, s32, s3i, ...} ),  
{s11, s12, ..., s1i, p1}, {s21, s22, ..., s2i, p2}, {s31, s32, ..., s3i, p3} )).
2. Method as claimed in claim 1, characterised in that the interleaved program  
10 and schedule records are sorted on a time basis.
3. Method as claimed in claim 1, characterised in that schedule records only refer to program records that are prior in the coding scheme  
( {p1, s11, s12, ..., s1i}, {p2, s21, s22, ..., s2i}, {p3, s31, s32, s3i, ...} ).  
15
4. Method as claimed in claim 1, characterised in that the interleaved program and schedule records are coded in a section separate and prior in the coding scheme from other sections comprising information relating to programs.
- 20 5. Method as claimed in claim 4, characterised in that the section comprising interleaved program and schedule records is preceded by a section comprising general information.
- 25 6. A device comprising a coder to a coder for coding EPG (electronic program guide) data comprising program and schedule records in accordance with the method as claimed in any of the claims 1 to 5 above.

7. A receiving device (RC) comprising a decoder for decoding EPG (electronic program guide) data comprising program and schedule records which are coded in accordance with the method as claimed in any of the claims 1 to 5 above.

5 8. A computer program comprising program code means for performing a method in accordance with the invention when said program is run on a computer as well as in any computer program product comprising program code means stored on a computer readable medium for performing a method in accordance with the method as claimed in any of the claims 1 to 5 when said program is run on a computer.

## ABSTRACT:

EPG data regarding programs and their scheduled times are structured and/or transmitted in a way such that *program and schedule records* are interleaved. This scheme allows better handling by receiving devices such as embedded devices (i.e. LCD remote controls), since a more efficient receipt and storage of transmitted data is possible. In particular the receiving device can read, parse and store the downloaded EPG data *on the fly* as it's being received (it can start reading, parsing and storing before the complete reception of data is finished). At any time the device would have to stop storing EPG data into persistent storage, (almost) all of the data that was stored can actually be used.